

and 22°; Grand Haven, 36° and 21°; Erie, 45° and 22°; Key west, 28° and 16°; Charleston, 39° and 21°; Cape Henry, 38° and 22°; Portland, 54° and 32°.

*Frosts* were reported as follows: California, 1st, 2nd, 3rd, 4th, 5th, 6th, 12th, 13th, 18th, 19th, 20th, 23rd and 30th. Nevada, 1st, 2nd, 3rd, 4th, 5th, 6th, 11th, 12th, 15th, 18th and 26th. Colorado, nearly every day; at Pike's Peak on the 3rd; the first decade was the coldest in the history of the Pike's Peak station. Kansas, 1st, 4th, 5th, 6th, 7th, 8th, 10th, 13th, 14th, 15th, 23rd, 25th and 28th. Indian Territory, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 14th, 15th, 16th, 17th, 22nd and 23rd. Texas, 1st, 2nd, 4th, 5th, 17th, 14th, 15th, 21st, 22nd, 23rd and 24th; Galveston, 14th, 22nd, 23rd and 24th. Cairo, 1st. Norfolk, 17th. Indianola and Key West, none.

*Ice* formed on several nights as follows: 2nd, at Visalia; 3rd,  $\frac{1}{4}$  inch thick on the Bay of Oakland, Cal.; 3rd and 4th, at Sacramento; 5th, at Vicksburg; 6th, 7th and 16th, St. Marks; 5th and 6th, Mobile; 4th, Keokuk and Escanaba; 5th, Alpena; 12th, Indianapolis; 7th, Knoxville; 1st, Logansport; 6th and 7th, Tybee Island; 2nd, Sandy Hook.

## PRECIPITATION.

*In General.*—The general distribution of rain and melted snow for the month is shown in chart No. III. By reference to the table in the lower left hand corner of this chart it will be seen that the amount of precipitation has been considerably above the normal in the Atlantic coast States and California, and about normal in the East Gulf States and Oregon, while a considerable deficiency occurs in the interior of the country; areas of no precipitation are shown on the chart in northern Missouri and southern Iowa, in western Nebraska, and in Dakota and Montana.

*Special Heavy Rains.*—3d, Ft. Barrancas, Fla., 2.50 inches. 7th, Santa Cruz, Cal., 1.83 in.; Brownsville, Tex., (6th and 7th) 3.26 in. 8th, Santa Cruz, Cal., 1.46 in. 9th, Mendon, Mass., 2.02 in.; Jacksonville, Fla., (8th and 9th) 2.04 in.; Mayport, Fla., (8th and 9th) 3.72 in.; St. Mary's, Ga., (8th and 9th) 2.20 in.; Daytona, Fla., 4.00. 10th, Smithville, N. C., (9th and 10th) 3.20 in.; Charleston, S. C., (9th and 10th) 2.85 in.; Wilmington, N. C., (9th and 10th) 3.19 in.; Auburn, N. H., 3.12 in.; Lenoir, N. C., (8th to 10th) 3.00 in.; Goldsboro, N. C., (9th and 10th) 2.00 in.; Cape Henry, Va., 2.18 in.; Key West, Fla., (9th and 10th) 3.01 in. 11th, Rochester, N. Y., (10th and 11th) 3.62 in.; New London, Conn., (10th and 11th) 2.00 in.; Boston, Mass., (10th and 11th) 2.67 in.; Waltham, Mass., 4.20 in.; New Haven, Conn., (10th and 11th) 2.53 in.; Thatchers' Island, Mass. (10th and 11th) 2.20 in. 12th, Ft. Sill, Ind. T., 1.68 in. 14th, Mystic, Conn., 1.80 in. 16th, Sacramento, Cal., (15th and 16th) 3.91 in.; Red Bluff, Cal., (14 to 16th) 9.12 in.; Los Angeles, Cal., (14th to 16th) 2.14 in.; 18th, Corsicana, Tex., 1.85. 19th, New Orleans, La., 1.80 in.; Galveston, Tex., (18th and 19th) 1.65 in. 22nd, Sacramento, Cal., 1.34 in. in six hours; Red Bluff, Cal., (21st and 22nd,) 2.98 in. 24th, Daytona, Fla., 3.00 in.; San Francisco, Cal., 1.60 in.; Red Bluff, Cal., 1.81 in. 25th, Santa Cruz, Cal., 2.30 in. 27th, Lebanon, Mo., (26th and 27th,) 2.37 in.; Red Bluff, Cal., 2.92 in. 29th, Fort Barrancas, Fla., (29th and 30th,) 2.40 in.; Baton Rouge Barracks, La., 1.55 in. in two hours. 30th, Montgomery, Ala., 1.91 in.; Daytona, Fla., 3.30 in. 31st, Charleston, S. C., (30th and 31st,) 3.08 in.; Wilmington, N. C., 2.51 in.; Cape May, N. J., 2.09 in.

*Large Monthly Rain-falls.*—At Red Bluff, Cal., 20.71 in.; Santa Cruz, Cal., 12.06 in.; San Francisco, Cal., 11.97 in.; White Plains, N. Y., 11.10 in.; Olympia, Wash. Ter., 9.82 in.; Cape Hatteras, N. C., 9.43 in.; Waltham, Mass., 9.43 in.; Sacramento, Cal., 9.26 in.; Okahumpka, Fla., 9.25 in.; Cape Lookout, N. C., 9.20 in.; Point Pleasant, La., 8.71 in.; Roseburg, Cal., 8.70 in.; Mt. Washington, N. H., 8.54 in.; Auburn, N. H., 8.30 in.; Rochester, N. Y., 8.05 in.; Fall River, Mass., 7.80 in.; Daytona, Fla., 7.63 in.; Somers, Mass., 7.60 in.; Boston, Mass., 7.60 in.; Trenton, N. J., 7.55 in.; Wilmington, N. C., 7.52 in.; Mill Village, N. H., 7.11 in.; Newport, R. I., 7.06 in.; Eastport, Me., 7.05 in.

*Small Monthly Rain-falls.*—At Bismarck, D. T., North Platte and Sydney Barracks, Neb., Ames, Iowa, Fort Keogh, Mon., Grant City and Unionville, Mo., none; Colorado Springs, Col., 0.02 in.; Fort McPherson, Neb. and Fort Griffin, Tex., 0.04 in.; Fort Pembina, D. T., Hopkins, Mo., Concho and McKavett, Tex., 0.05 in.; Phoenix and Florence, A. Ter. and Breckenridge, Minn., 0.06 in.; Cheyenne, Wyo. Ter., 0.08 in. Denver, Col. and Olivet, D. T., 0.10 in.; Norfolk, Neb., Pembina, D. T. and Fort Sanders, Wyo. Ter. 0.12 in.

*Floods and High Tides.*—11th. Freshets along the Staunton and Roanoke rivers; bridges carried away. California, 16th, Los Angeles and Red Bluff, railroad bridges washed away and much damage done throughout the country. At San Buenaventura, Santa Barbara and More's Landing, wharves were carried away. Santa Cruz, Cal., 25th, San Lovenza river rose five feet, surf higher than for six years; a heavy W. sea-swell occurred along the California coast. 31st. High tides along the Atlantic seaboard, doing considerable damage on the New Jersey and Long Island coasts. Sandusky, Ohio, water in bay rose three feet during high north-east winds; at Kelly's Island, the water rose higher than for eleven years, the bank protection being badly washed away.

*Hail.*—3rd, McPherson, Barracks, Ga.; 4th, Accotink, Va.; 8th, Fort Gibson, Ind. Ty.; 9th, Rupert, Pa.; 10th, Detroit, Mich.; 13th, Fort Wayne, Mich.; 14th, Cornish, Me.; 22nd, Sacramento, Cal.; 25th, Colorado Springs, Col., Guttenburg, Iowa, Neosha, Mo.; 26th, Fort Gibson, Ind. Ty., Lawrence, Kan., Great Bend, Kan., Cornish, Me., Standish, Me., Springfield, Mo.; Cincinnati, Ohio, Hillsboro, Ohio; 30th, Vevay, Ind., Asheville, N. C., Red Bluff, Cal.; 31st, Willet's Point, N. J., Sandy Springs, Md., Freehold, N. J., Linden, N. J., White Plains, N. Y., Flushing, N. Y., West Chester, Pa., Philadelphia, Pa., Accotink, Va.

*Sleet.*—1st, Rochester; Cresco, Iowa; Chicago. 2nd, Rochester; Cresco, Iowa. 3rd, Corsicana and Fredericksburg, Texas. 4th, West Point, N. Y.; Fayette, Miss.; Springfield, Mass.; Wood's Holl. 6th, Galveston. 7th, Jacksboro', Fredericksburg, Texas. 8th, Fort Gibson; McPherson Barracks, Ga.; Augusta; Fort Sill. 9th, Davenport; Detroit; Pembina; Guttenburg, Iowa; Cleveland; Westchester, Pa.; Baltimore. 10th, Detroit; Indianapolis; Louisville; Fort Prebble, Me.; Burlington, Vt.; Mt. Washington; Winnemucca. 11th, Erie; Fort Prebble, Me.; West Waterville, Me.; Mt. Washington. 13th, St. Louis; Cleaveland, Tenn. 14th, Toledo; Rochester; Fort Prebble, Me.; Bangor, Me. 17th, Camp Douglas, Utah; 18th, Camp Douglas, Utah; Galveston. 20th, Milwaukee. 22nd, Madison Barracks, N. Y.; Detroit. 23rd, New Bedford, Mass. 25th, Fort Prebble, Me. 26th, Sandusky; Fort Prebble, Me.; Madison Barracks, N. Y.; Albany. 27th, Oswego; Fort Prebble, Me. 28th, Oswego; Indianapolis. 29th, Leavenworth; Keokuk. 30th, Spartanburg, S. C.; Indianapolis; Louisville; Macon, Ga.; New Harmony, Ind.; Vevay, Ind.; Statesville, N. C.; Mt. Auburn, Ohio. 31st, Morgantown; Louisville; New Bedford, Mass.; Baltimore; Wood's Holl.

*Depth of Snow at Close of Month.*—In New England from 1 to 36 inches; in the Middle Atlantic States, 1.5 to 18; in the Upper Lakes, 0.5 to 11; in the Lower Lakes, 7 to 18; in Tennessee and the Ohio valley, 2 to 8; in Kansas, 0.25 to 4.5; in Nebraska, 1.5 to 3; in Missouri, 1 to 2; in Minnesota, 0.5 to 6; at Pike's Peak, Col., 12; at Salt Lake City, a trace; at Yankton, 1.

*Rainy Days.*—The number of days on which rain or snow has fallen averages as follows: New England, 7 to 20; Middle Atlantic States, 5 to 22; South Atlantic States, 2 to 12; East Gulf States, 3 to 17; West Gulf States, 4 to 11; Lower Lake region, 12 to 25; Upper Lake region, 9 to 18; Upper Mississippi valley, 2 to 15; Lower Missouri valley, 0 to 10; Tennessee and the Ohio valley, 7 to 21; Northwest, 0 to 6; Rocky Mountain region, 0 to 7; California, 7 to 23.

*Cloudy Days.*—The number reported by the volunteer observers is as follows: New England, 7 to 13; Middle Atlantic States, 6 to 24; South Atlantic States, 3 to 14; East Gulf States, 5 to 14; West Gulf States, 3 to 11; Lower Lake region, 10 to 23; Upper Lake region, 9 to 15; Upper Mississippi valley, 6 to 19; Lower Missouri valley, 5 to 13; Tennessee and the Ohio valley, 14 to 22; the Northwest, 3 to 17; Rocky Mountain region, 0 to 7; California, 1 to 6.

*Precipitation from a Cloudless Sky.*—At Bangor, Me., on 3rd.

## RELATIVE HUMIDITY.

The average percentages of relative humidity for the month range about as follows: New England, 64 to 81; Middle Atlantic States, 62 to 84; South Atlantic States, 66 to 80; East Gulf States, 75 to 80; West Gulf States, 63 to 74; Lower Lake region, 73 to 83; Upper Lake region, 70 to 86; Tennessee and the Ohio valley, 66 to 75; Upper Mississippi valley, 66 to 80; Lower Missouri valley, 65 to 84; California coast, 61 to 75; Sacramento valley, 74 to 80. High stations report the following monthly average percentages, uncorrected for elevation: Mt. Washington, 84.7; Pike's Peak, 61.4; Cheyenne, 52.1; Denver, 52.7; Salt Lake City, 64.8; Virginia City, 62.5; Boise City, 66.2; Winnemucca, 58.0.

## WINDS.

*In General.*—The prevailing winds, at the Signal Service Stations, are shown by arrows on chart No. III. The prevailing direction is there seen to be northwest, except in the Ohio valley, Lake region and west of the Rocky Mountains, where southerly or westerly winds predominate.

*Total Movements of the Air.*—The following are the largest monthly movements, as recorded at the Signal Service stations, viz: Pike's Peak, 15,734 miles; Cape Lookout, 13,602 miles; Sandy Hook, 13,494 miles; Thatcher's Island, 13,038 miles; Cape May, 12,510 miles; Barnegat, 10,595 miles; Cape Henry, 10,322 miles; Cape Hatteras, 10,287 miles; Indianola, 10,006 miles; Sandusky, 9,758 miles; Eastport, 9,340 miles; Breckenridge, 9,290 miles; Boston, 9,152 miles; Woods Holl, 9,146 miles; Philadelphia, 9,005 miles; Cheyenne, 8,981 miles; New York, 8,717 miles. *The smallest are:* Visalia, 1,869 miles; Deadwood, 2,198 miles; Salt Lake City, 2,569 miles; Lynchburg, 2,657 miles; Augusta, 2,916 miles; Eagle Pass, 2,928 miles; Boise City, 3,134 miles; San Antonio, 3,108 miles; Brackettsville, 3,010 miles; Nashville, 3,249 miles; Shreveport, 3,310 miles; Springfield, 3,441 miles; San Diego, 3,521 miles; Dubuque, 3,812 miles; Los Angeles, 3,923 miles. At Mt. Washington a continuous record has not yet been accomplished, but velocities of 100 miles and over were recorded on nine days, and the total monthly movement may be estimated at about 35,000 miles.